

US EPA ARCHIVE DOCUMENT

HADCO

21 July 1995

U.S. Environmental Protection Agency
Regulatory Reinvention Pilot Projects
FRL-5197-9
Water Docket
Mail Code 4101
401 M Street SW
Washington, D.C. 20460

RE: Facility Based Project XL
HADCO Corporation
New Hampshire, New York
and California Facilities

Dear Sir or Madam:

HADCO Corporation respectfully submits its proposal to enhance the direct recycling of metal bearing streams from its five printed wiring board manufacturing (PWB) operations located in New Hampshire (3), New York (Owego) and California (Watsonville). All facilities are classified under SIC 3672.

HADCO is pleased to submit this proposal, as it the logical continuum of making the PWB industry "greener" through the use of cleaner, cheaper and smarter raw materials, processing steps and waste treatment. Project XL will provide an opportunity to demonstrate the efficiency, and both economic and environmental benefits of this direct recycling approach not only for HADCO, but also for the PWB industry, which has drastically reduced its use of toxics. This proposal has tremendous network application to the PWB industry, which is 90% small businesses, and thus total economic and environmental benefit on a larger scale than just HADCO.

Should you have any further questions or data requests, please contact me at 603/898-8010 x 2424, or via fax at 603/890-1298, or via email at lwilmot@hadco.com.

Sincerely,



Lee R. Wilmot
Manager, Corporate SAFETY,
Health & Environmental Affairs

cc: [REDACTED], EPA Washington
George Hawkins, EPA New England
Dick Saporito, HADCO

Facility-based Project XL Proposal

Enhanced Direct Recycling of Metal Bearing Sludge from Printed Wiring Board Manufacturing Wastewater Treatment

**HADCO CORPORATION
Salem, New Hampshire**

Summary.

HADCO proposes a trial evaluation of removing from Subtitle C of the Resource Conservation and Recovery Act of a wastewater treatment sludge generated in its Printed Wiring Board (PWB) facilities. The listing documents for this sludge are based on analysis done in the 1970s. The chemical processing standard in the industry has changed substantially, and has eliminated the historic threats caused by this waste. Accordingly, EPA should allow a trial pilot to enhance recycling of this waste. The result will be waste minimization, increased recycling, pollution prevention and reduced administrative costs. On the basis of success in the initial pilot, EPA and the Printed Wiring Board industry should consider the development of an innovative regional recycling market exchange between larger and smaller facilities.

The Facility and Industry.

HADCO Corporation is a leading manufacturer of printed wiring boards and electronic interconnection products. It operates six manufacturing facilities nationwide: four in New Hampshire (Derry, Hudson and two in Salem), one in New York (Owego) and one in California (Watsonville). Total employment is 2100. Facility size ranges from about 100 employees in the Salem assembly division to over 700 employees at its New York facility.

HADCO Corporation is proactive in its pollution prevention and waste minimization efforts. It is a charter member of the 33/50 program, under which it committed to a 98% reduction of three chemicals, and achieved 100% reduction by 1995. This achievement eliminated over two million pounds per year of chlorinated solvent emissions. Regarding wastewater treatment sludge, HADCO switched to a unique treatment chemistry developed by Romar Technology (Danvers, MA) in 1992, and has seen a 50% reduction in its sludge generation with this ferrous dithionite based material. This change has reduced sludge volume by over 200 tons a year.

The printed wiring board (PWB) industry is a fundamental one in the electronic industry. Virtually every electronic device uses a PWB as the building base for its components. The Institute for Interconnecting and Electronic Circuits (IPC) reports that there are over 700 PWB manufacturers in the U.S., employing over 150,000 persons.

The Proposal.

Listing of a hazardous waste under the Resource Conservation and Recovery Act (RCRA) is designed to ensure that a harmful byproduct of industrial production is transported, stored, treated and disposed in manner safe to humans and the environment. This degree of protection is usually afforded at significant cost. This cost is warranted for wastes that are hazardous. This cost is not warranted, and can be detrimental in effect, for wastes that are not hazardous.

This project concerns a wastewater treatment (WWT) sludge generated from printed wiring board (PWB) manufacturing facilities (SIC 3672). The PWB industry can use a variety of chemical etchants to dissolve copper foil from the copper clad laminate material to produce the desired circuit. Etchants can be acidic or basic, as long as they dissolve copper. One of the etchants used in the early 1970s was chromic sulfuric acid (a mixture of chromic and sulfuric acids). Some PWB shops were still using chrome sulfuric acid in the late 1970s when the listing criteria for Subtitle C wastes under RCRA were developed. Accordingly, the original listing documents indicate that PWB WWT sludge contains cadmium, chromium, amenable cyanide and nickel.

The consequence of the listing is dramatic. The waste must be stored, treated and disposed according to the rigorous and expensive Subtitle C hazardous waste regulations. Licensed hazardous waste haulers must transport the waste to special facilities in Pennsylvania or Arizona for treatment and drying. The filter cake is then transhipped to Canada, Arizona or Mexico (or offshore) to recycle the high copper content (generally higher than copper ore -- 7-11 % in the sludge in comparison to 4-5% in ore). Due to these costs, a PWB manufacturer must pay to have this copper-rich sludge treated and recycled, despite its relatively significant value. Many small PWB facilities cannot afford this cost, and elect to ship the waste for disposal directly at a hazardous waste facility.

However, given toxicity of chromic sulfuric acid (both from a worker safety and environmental perspective), the PWB industry began replacing it with non-chrome etchants, even before the late 1970s when the listing analysis was done. For example, HADCO switched from chrome sulfuric acid to the less toxic ammonium chloride in 1977. Since the substitution, HADCO has conducted analysis of its WWT sludge using EPA's TCLP protocol that indicates the total content of both cadmium and amenable cyanide are below the characteristic leaching criteria and the landban concentrations listed in 40 CFR 261.41. In addition, although both chromium and nickel constituents exist in the sludge above the leaching characteristic, neither compound leaches from the sludge to trigger a characteristic hazard. (Reference attached 1990 TCLP analysis.)

In summary, the waste generated by HADCO and much of the PWB industry is listed under Subtitle C for historic reasons that are no longer valid. After the substitution of a less toxic etchant, the waste is not hazardous by characteristic. Nonetheless, HADCO and the PWB industry is still regulated by a blanket F006 Subtitle C listing for the WWT sludge. This proposal seeks to demonstrate: a) that the waste should not be listed under Subtitle C, and b) that delisting will yield substantial environmental and economic benefits.

With respect to listing, HADCO provides with this application, and will provide over the course of the project, analysis that clearly indicates the waste should not be listed under Subtitle C. (See also 1995 With respect to the benefits of delisting, HADCO expects there will be many, including the following:

1. HADCO (and other PWB manufacturers) will have an economic incentive to send the wastes directly to recycling rather than transship the waste through Subtitle C processing facilities.
2. HADCO may be able to recycle other copper-rich wastes (non-RCRA) which are currently landfilled (i.e. drilling and edging dust) due to the income stream from recycling the sludge off-setting the increased transportation cost for these non-RCRA materials.
3. HADCO will invest the cost savings (and income) associated with direct recycling into an on-site sludge drier (the WWT waste is typically 40-50 percent solids. On-site use of a drier will typically reduce the volume of wastes transported by half.
4. The number of transport miles associated with the transshipment of undried waste to Pennsylvania and then Canada (or Arizona or Mexico) will be substantially reduced. This will reduce the use of fossil fuels, reduce NOx and CO emissions, and will reduce the chance of waste accidents in the community.
5. Costs associated with documenting the handling of hazardous waste will be reduced.
6. HADCO expects that the information uncovered in this project will be transferable to a large number of PWB manufacturers, which are otherwise considering individual delisting applications. Costs associated with producing and reviewing comprehensive, individual delisting applications for each facility will be reduced. Note: there are nearly 700 PWB manufacturers in the United States (many, like HADCO, with more than one facility).
7. Upon successful petition of delisting the waste, HADCO and EPA should consider an innovative market-based trading system for PWB WWT sludge. This market would allow smaller companies that could not afford an on-site dryer to sell their waste to larger companies who can dry the waste and realize revenue from recycling.

In essence, this project directly supports pollution prevention, recycling, reduction of use of virgin resources, and a reduction of the administrative costs associated with environmental protection.

The Steps.

If this proposal is selected under Project XL, HADCO plans to implement the following steps, working in close partnership with EPA and the New Hampshire Department of Environmental Services (and other agencies in other states as necessary):

1. Supplemental analysis of the WWT sludge using EPA's TCLP protocol to reaffirm the non-hazardous nature of the waste.
2. Analysis of the cost savings created by the delisting of the WWT sludge.
3. Analysis of the pollution prevention efforts that can be undertaken as a result, including installation of a drier and recycling of solid non-RCRA wastes.
4. Communication with all relevant state, federal, and if needed, foreign governments concerning the trial delisting of the wastes.
5. Analysis and monitoring of wastes shipped directly for recycling according to a schedule and protocol agreed to with EPA and NHDES.
6. Analysis of the opportunity for medium and large PWB manufacturers to provide drying and disposal capacity for smaller facilities where such activity is not economical. In exchange for drying the waste at no charge, medium to larger companies would receive any revenue created by direct recycling.

Selection Criteria.

1. Environmental Results.

In general, this project supports the principles of recycling, pollution prevention, and reduced use of virgin resources. More specifically, the project provides three environmental benefits.

First, there will be substantially reduced air emissions from transport trucks. Currently, the trucks haul this material from New England and other east coast generators to Pennsylvania, and then from PA to either Canadian smelters or shipping ports to non-North American countries. After delisting, waste will be shipped directly to the smelters. Further, by changing the disposition of this material stream to a revenue source (or at least a reduced cost), HADCO and other generators may be able to justify the installation of on-site sludge dryers that reduce the volume of wastes. Direct shipping may reduce transport miles by up to 50%; and installation of sludge driers by another 25%. Mobile source air emissions associated with the disposal/recycling of this waste may then be reduced by 75%.

Second, the revenue stream caused by the direct recycling of WWT sludge may allow PWB manufacturers to justify recycling non-RCRA waste streams that are also copper rich (e.g. drilling and edging dust). These waste streams are currently landfilled. This will increase recycling and prevent the generation of landfill waste.

Third, the reduction of transport miles by 50% reduces the likelihood of accidents involving this waste in any community through which the waste is transported.

At a conceptual level, this project provides a pilot example of where a regulatory agency can retarget a regulatory scheme to wastes that are in fact a risk to humans and the environment. The importance of regulating hazardous waste is clear -- but the importance of deregulating non-hazardous wastes should also be clear. The resources saved may alternatively be used to improve the environment in other ways, but all in all, represent a more efficient allocation of economic resources.

2. Cost Savings and Paperwork Reduction.

Cost Savings. HADCO currently pays \$3-400 per ton for disposal of its WWT sludge. HADCO generates over 600 tons per year of WWT sludge, and pays over \$200,000 per year for its disposal. Direct shipment to copper smelters in Canada from its New Hampshire and New York facilities will hopefully result in positive revenue (this may be a marginal revenue, or instead, a significant reduction in the cost). The resulting savings may then be used to justify sludge drying and hauling of other non-RCRA copper streams. HADCO has not at this point determined the exact cost savings associated with delisting. If this project is approved, the first step will be to determine the exact cost savings, and the resulting pollution prevention/recycling steps that can be implemented. A reasonable estimate for the cost of the installation of an on-site drier is \$100,000, suggesting that installation of a drier upon a trail delisting will be economical.

Paperwork. Paperwork reduction will be realized by not having to file and submit hazardous waste shipment manifests, not only by generators but by state waste agencies. Further, shipments to Canada will not require formal pre-approval and notification required for the shipment of RCRA subtitle C wastes.

In addition, HADCO intends that this project be a pilot for the PWB industry. We intend that the pilot will confirm that non-chromic WWT sludge does not meet the hazardous waste characteristics under RCRA subtitle C, and that an alternative is to delist the waste. This delisting could apply to this type of waste throughout the PWB industry (subject to certain demonstrations by individual companies), and would avoid the cost and paperwork (and resources needed to review the paperwork) associated with numerous individual delisting applications.

3. Stakeholder Support.

No active support of this proposal from various stakeholders has been sought. However, we expect that communities between New Hampshire and Pennsylvania would welcome not having WWT sludge hauled back and forth through their states prior to recycling. We do not anticipate community concern with direct shipment of these wastes to Canada for recycling, but will certainly consider outreach efforts that may be appropriate.

HADCO also plans that revenue realized by direct recycling of the WWT waste will allow the recycling of waste streams currently landfilled. This will reduce the concern caused by copper wastes in a landfill. For example, HADCO has been informed by one of its disposal facilities that an EPCRA monitoring organization has asked about the amount of copper disposed at that site.

4. Innovation/Multi-Media Pollution Prevention.

This proposal achieves solid waste minimization and recycling, prevents the unnecessary transshipment of wastewater; reduces mobile air emissions (the largest source of VOCs and CO in most states), and reduces the use of virgin resources. Furthermore, the improved economics of recycling may justify the recycling of a solid (non-RCRA) waste which is presently landfilled.

5. Transferability.

The proposal is directly transferable to most other PWB manufacturers. If HADCO confirms the non-hazardous nature of the WWT sludge over the period of the trial, EPA could consider delisting the waste for all PWB manufacturers that could document the required process substitution and TCLP analysis.

Upon proven success of the pilot delisting, an innovative "second stage" project may be considered. Most PWB manufacturers are small businesses that do not have the capacity (financial or structural) to install sludge driers. HADCO would consider networking with smaller manufacturers for sludge drying and disposal. The prospect is that HADCO would offer free drying and disposal of WWT sludge from smaller manufacturers in exchange for the realization of recycling revenue for the resulting filter cake. Smaller facilities will save the cost of landfilling the waste, additional copper wastes will be recycled, HADCO will realize a revenue stream, and the landfilling of these solid wastes will be eliminated. Conceivably, medium to larger facilities will compete to purchase or acquire these wastes from smaller facilities in a market system.

6. Feasibility.

This project is technically feasible. HADCO can accomplish the necessary analysis and administration of a pilot project to delist and change the handling of the WWT waste.

Administrative feasibility will require coordination with EPA Regions 1 and 2, and the States of New York and New Hampshire (initially), and subsequently, Region 9 and California DTSC. Some administrative coordination with Canada may be needed.

HADCO Corporation has the financial capability to carry out this proposal.

7. Monitoring, Reporting and Evaluation.

Technical. The technical basis of the removing this material from RCRA subtitle C will be monitored according to a schedule agreed to with EPA and the relevant states. At a minimum, HADCO would expect to confirm the initial analysis of the WWT waste as non-hazardous, and will subject wastes shipped directly to recycling centers to TCLP analysis to monitor the conclusion. The pilot will be terminated if the wastes are determined to be hazardous according to the applicable criteria.

Benefits. HADCO will develop the following data on past shipments by state (NH, NY, CA):

1. Number of shipments to processing facility and cost;
2. Average tons/shipment;
3. Miles travelled by transporting trucks (both to processing facility and then to recycling facility);
4. Estimate of truck fuel consumed;
5. Number and population of metropolitan areas on transport routes;
6. Tons of non-RCRA copper streams landfilled.
7. Revenue realized (or costs reduced) due to direct recycling.

For comparison, the same data will be developed after the XL project is implemented. This comparison will be done on an annual basis.

8. Shifting of Risk Burden.

This proposal is founded on the principle that the WWT sludge is not a hazardous waste and therefore does not present a risk to workers or the community. The proposal is consistent with the goals of protecting worker safety and ensuring that environmental protection is afforded relative to potential environmental harm, and that no group is subject to unjust or disproportionate environmental impacts. Since fewer communities will be exposed to WWT sludge through transportation and landfilling of waste materials, risks shall be reduced for everyone in these communities.

Attachments:

Alpha Analytical Laboratories Certificate of Analysis, dated October 1, 1990, indicating the WWT sludge from HADCO - Derry, NH is not-hazardous.

ChemServe analysis, dated June 14, 1995, indicating the WWT sludge is from HADCO - Hudson, NH is non-hazardous.

CC: John Kessler, Project XL Coordinator
U.S. EPA - Washington

George S. Hawkins, Special Assistant
U.S. EPA - New England

ALPHA ANALYTICAL LABORATORIES
CERTIFICATE OF ANALYSIS

MA 086 NH 198958-A CT PH-0574

Laboratory Sample Number: 904955.1 Date Received: 09/17/90
 Sample Matrix: Solid Date Reported: 10/01/90
 Condition of Samples: Satisfactory Field Prep: None
 Number & Type of Containers: One glass jar
 Analysis Requested: TCLP Extraction, RCRA 8 Metals

PARAMETER	RESULT	UNITS	MDL**	REF*	METHOD	DATES	
						EXT/PREP	ANALYSIS
TCLP Extraction	----	-----	---	13	----	09/21/90	-----
RCRA 8 Metals							
Arsenic	ND	mg/L	0.005	1	7060	----	10/01/90
Barium	ND	mg/L	0.05	1	6010	----	10/01/90
Cadmium	0.02	mg/L	0.01	1	6010	----	10/01/90
Chromium	ND	mg/L	0.02	1	6010	----	10/01/90
Lead	2.42	mg/L	0.05	1	6010	----	10/01/90
Mercury	ND	mg/L	0.0005	1	7470	----	10/01/90
Selenium	ND	mg/L	0.005	1	7740	----	10/01/90
Silver	ND	mg/L	0.01	1	6010	----	10/01/90

COMMENTS: * Complete list of References found in Addendum I



HADCO CORPORATION

LABORATORY # : F16-95-01
CONTORL # : 10623
DATE SAMPLED : 06/14/95

JOB NAME : N/A
JOB # : N/A
LOCATION : N/A

<u>TEST</u>	<u>RESULTS</u>	<u>DATE/TIME</u>	<u>COMPLETED</u>	<u>EPA METHOD #</u>	<u>DETECTION</u>	<u>ANALYST</u>
<u>PARAMETER</u>					<u>LIMIT</u>	

SAMPLE IDENTITY: METAL HYDROXIDE SLUDGE COLLECTED FROM ROLL-OFF (1)

COMPOSITE(S)

TOXIC CHARACTERIZATION LEACHATE PROCEDURE (TCLP 1311)

ARSENIC	5.0	<0.100	06/29/95	6010	0.100	SC
BARIUM	10.0	<0.500	06/29/95	6010	0.500	SC
CADMIUM	1.0 (0.67)	<0.010	06/28/95	6010	0.010	RH
CHROMIUM	5.0 (2.77)	0.091	06/28/95	6010	0.010	RH
LEAD	5.0 (0.81)	0.080	06/29/95	6010	0.050	SC
MERCURY	0.2	0.0023	06/28/95	7470	0.0005	MC/SC
SELENIUM	1.0	<0.100	06/29/95	6010	0.100	SC
SILVER	5.0	<0.010	06/28/95	6010	0.010	RH

ALL RESULTS ARE IN (mg/L) EXCEPT AS NOTED

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To	CEC A. J. [unclear]	From	S. Rap...
Co.		Co.	
Dept.		Phone #	
Fax #		Fax #	